Firm Response to Natural Disasters:
How Does Organizational Learning Affect the Location Decision?

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EXTENDED ABSTRACT

INTRODUCTION

Despite the potentially devastating effects of major natural disasters, for most managers, natural disaster risk is not a top-of-mind issue. Day-to-day operations often take precedence, even when a firm is located in an unusually disaster prone part of the world. Social psychologists suggest that the threat of natural disasters tends to receive far less attention, particularly in comparison to other crises such as financial crisis, terrorism or political violence, because individuals generally do not perceive natural disasters as manageable events. There is a widespread perception that natural disasters are unavoidable and unmanageable ‘acts of God’ that are outside the control of managers and their firms (Slovic, Fischhoff, & Lichtenstein, 2000a; 2000b). Research on firm response to risk, however, suggests that it may indeed be possible for managers to develop capabilities around disaster management through experiential learning (Oetzel & Oh, 2014).

Since most people continue to see natural disasters as unmanageable events, it is not surprising that there is an emphasis - by multiple sectors of society - on post-disaster clean up rather than pre-disaster preparedness. This ex post approach to disaster response may become less and less feasible if the global trend towards more frequent and devastating disasters continues over the coming years. According to Travelers Insurance, “earthquakes, floods, tornados, hurricanes, blizzards, wildfires, hailstorms, and other natural occurrences cause
billions of dollars in economic losses each year (Travelers, 2014: page 1).” Hurricane Katrina alone caused $100 billion in losses and more than 1,300 deaths (Travelers, 2014). The accompanying disruption to business and loss of jobs from such a disaster can affect a region for years to come. Population levels have reportedly declined by over 120,000 in New Orleans, Louisiana since Hurricane Katrina and there is already substantial job loss reported in parts of the Philippines hit by Typhoon Haiyan (Associated Press, 2012; Bradsher, 2014).

Insurers and scientists alike predict that the frequency and severity of natural disasters will increase in the coming years with devastating effects in both financial terms and loss of life (IPCC, 2012; Oh & Reuveny, 2010). One key reason for the projected increase is the growing population in mega-cities and highly urbanized areas. The high concentration of people and industry makes these geographic areas particularly vulnerable. Since the trend toward greater urbanization shows no sign of abating, unless something changes, the cost of natural disasters will only increase (PWC, 2013).

Given these trends, it appears that disaster management may be an increasingly important capability for firms to develop. Firm competency in disaster management can also have a positive impact on the wider communities and regions in which firms operate. Governments often have limited resources – even in developed countries – to address the scale and scope of a major disaster (e.g., national and local government response to Hurricane Katrina in 2005 and to Fukushima earthquake in 2011). Thus the purpose of this research is to identify the extent to which a foreign firm’s network with its own affiliates and the affiliates of other foreign firms increases intra- and inter-organizational learning and improves firm response to natural disasters in China.
THEORY AND HYPOTHESES

When considering investment locations for new subsidiaries, managers must weigh a variety of factors that may affect the desirability of the location, the development of firm-specific advantages, and the potential for risk to the firm (Anderson & Gatingnon, 1986; Dunning, 1998; Rugman & Verbeke, 2001). Examples of some of these location specific factors include poor governance and institutional quality, political and economic conditions, and the potential for major business disruption (Head & Mayer, 2004; Kaufmann, Kraay, & Mastruzzi, 2008; Oh & Oetzel, 2011). As managers weigh these various factors they must consider how the risk profile of locations under consideration might impact the industry they are in and the unique characteristics and needs of their firm.

Intel offers an interesting illustration of how companies weigh the factors influencing location choice (Alcácer, 2012; Alcácer & Herman, 2012). Some of the location factors that are critical for Intel’s Assembly and Test (A&T) facilities include the potential for business disruption given its highly efficient and globalized supply chain (Alcácer, 2012; Alcácer & Herman, 2012). For this reason, the company considers natural disaster risk as one of several critical factors when considering new investment locations (Alcácer, 2012; Alcácer & Herman, 2012). The authors of a case on one of Intel’s site selection decisions in Asia argue that natural disaster risk is of sufficient import to rule out one location under consideration (Alcácer, 2012; Alcácer & Herman, 2012). As a lesson in risk management, the authors argue that natural disaster risk is better assessed at the sub-national rather than the national level since the direct effect of natural disasters are rarely countrywide (except in the smallest countries). Additionally, the actual physical response to natural disasters is coordinated in the province or region where the disaster occurs.

Although companies like Intel may consider certain locations to be too risky for investment, few if any places are “risk free.” While it may be possible to identify lower risk
locations, few locations in the world are not subject to any type of natural disaster. Thus, once an MNC’s investment has been made, the need to prepare for potential threats to the subsidiary is still necessary. What, however, might managers do? In terms of preparing for natural disasters, firms may undertake a wide variety of activities including (but not limited to): conducting an assessment of firm vulnerability to natural disasters, establishing a natural disaster response plan, training employees about natural disaster preparedness, purchasing insurance for natural disasters and business discontinuity, and arranging to move business operations temporarily to another location, among others (Tierney, Lindell & Perry, 2001; Webb, Tierney & Dahlhamer, 2000). Once the disaster strikes, established evacuation plans, plans to maintain business continuity, and employee preparedness may yield dividends. The appropriate pre- and post-disaster planning will be dependent on a variety of industry- firm- and location-specific factors that will to some extent be unique to every disaster.

According to PricewaterhouseCoopers (PWC), the increase in intense natural disasters over the last few years has led several U.S. firms to start hiring public sector crisis management experts (PWC, 2013). Wal-Mart is one company to do so; it has made extensive disaster response plans under Mark Cooper, Senior Director of Global Emergency Management for Wal-Mart. The company established their Emergency Operations Center (EOC) at their corporate headquarters in the early 2000s after the September 11, 2001 terrorist attacks in the U.S. (PWC, 2013). According to Mark Cooper, the company identified and then combined the key business functions considered important before, during, and after a disaster. Through their analysis, they decided to establish disaster distribution centers, primarily located in areas at a high risk of disaster. Rather than relying solely on meteorological reports from the media, Wal-Mart also employs an in-house meteorologist who interprets weather data for the firm (PWC, 2013). By the time that Hurricane Katrina struck the Gulf Coast of the U.S. in August of 2005, Wal-Mart was well prepared to respond. According to press
reports, Wal-Mart was hailed as a “model for logistical efficiency and nimble disaster planning” in providing relief after Hurricane Katrina hit New Orleans (Barbaro & Gillis, 2005).

Given this background, we assume that when a firm’s networks are located in the same province as the subsidiary, the more valuable the information they are able to offer. In addition, we also assume that the lower the cultural (and corporate) distance between the subsidiary and other firms in the subsidiary’s network, the more valuable the information. Furthermore, we assume that networks of subsidiaries from the same MNC and the same industry will be particularly beneficial to managers.

We also argue that the value of subsidiary networks will positively moderate the negative effect of natural disasters on subsequent subsidiary entry. In-province networks in particular are assumed to be valuable since these networks may have more experience and local knowledge about local conditions and institutions. Another factor that may facilitate intra- and inter-organizational learning is geographic proximity due to information costs arising from distance and clustering or agglomeration benefits (Agarwal & Hauswald, 2010; Chang & Park, 2005; Chung & Song, 2004; Porter, 1995; Smith & Florida, 1994). Geographic proximity is valuable since firms operating in the same disaster-affected area will have greater knowledge of the key regional/provincial players involved in disaster response, the quality and capacity of the local government to respond, local transportation and other emergency resources, etc. Managers of firms outside the affected region may have much less understanding of the severity and nature of the disaster in question as well as who to work with and how ‘things get done’ in other localities. For these reasons, we assume that out-of-province subsidiary networks would not generally provide applicable experience and knowledge about the affected target location.
SAMPLE AND METHODS

To examine the effect of intra- and inter-organizational learning on the relationship between natural disasters and firm entry and expansion in China at the province-level, we used a sample of Fortune Global 500 firms listed in 2009, where the ranking was based on firm revenue in 2008, and their entry information into Chinese provinces between 1955 and 2008. Of these 500 firms, we excluded 43 firms originating from Mainland China, Hong Kong, and Taiwan. The entry information was collected from the Report of Transnational Corporations in China published by China Economic Publishing House.

Disaster information was collected from Emergency Disasters Database (EM-DAT), which is managed by the Center for Research on the Epidemiology of Disasters (CRED). EM-DAT is a global database on natural and technological disasters that contains essential core data on the occurrence and effects of more than 17,000 disasters in the world from 1900 to present. The main source of geo-demographic information about Chinese provinces was China Data Online managed by the University of Michigan. The information was supplemented by various data sources.

To test our model we used a conditional logit model of discrete time event history analysis (McFadden, 1974) that has been widely used in MNC location choice analysis (Chang & Park, 2005; Hahn, Bunyaratavej, & Doh, 2011; Jandhyala, 2013). The time dependence of the hazard (entry) is introduced in the model. The hazard of entry is computed by calculating the log of duration between a MNC’s first entry into China and the MNC’s entry into a target province.
RESULTS

The results show that a MNC is not likely to enter into a province that has severe natural disasters, but the effect is only marginally significant. It shows that the effects of geographically distant (outside a target province) networks have a negative impact on subsequent entry into a province except in the case of a MNC’s own subsidiary network. The negative magnitude is the highest for the network of the same industry and home country, followed by the network of the same industry and the same network of the home country. In contrast, geographically close (within a target province) networks have a positive impact on subsequent MNC entry into the province, except for the same industry network. The positive magnitude is the highest for the network of the same company, followed by the network of the same industry and same home country and the network of the same home country. The results show that most interaction terms are insignificant except for an interaction between natural disasters and the industry network outside a target province, which is positive and significant, and an interaction between natural disaster and MNC’s own subsidiary network outside a target province, which is negative and significant.

In addition, the results also show that the same home country subsidiary network in a target province affected by a natural disaster will positively moderate the negative effect of natural disasters in the province. Other types of networks (the same industry network and own MNC network) in the target province do not appear to provide natural-disaster related learning benefits to a MNC. On the other hand, two types of geographically distant MNC networks (the own MNC network and the same industry and home country network) actually lower the likelihood of subsequent entry when a target province suffers from natural disasters. These two types of networks are closer (in a non-geographic sense) to the MNC than the other two types of networks (the same industry and the same home country networks).
DISCUSSION AND CONCLUSIONS

The reported increase in high impact natural disasters – from the 2011 earthquake and tsunami off the coast of Japan to earthquakes in New Zealand, Turkey and China to floods in Thailand – has led to thousands of death and billions of dollars in economic damage in affected countries. Individual firms in the path of these disasters face threats to power supplies, physical damage to firm property, and disruption to supply chains and business more broadly (PWC, 2013: A).

The results of our study suggest several implications for managers seeking to address the challenges posed by disasters. In general, localized networks are more valuable for intra- and inter-organizational knowledge sharing and learning than out-of-province networks. For mitigating the negative effects of natural disasters, however, a subsidiary’s in-province network with other subsidiaries from the same home country - appears to be the only network to facilitate subsequent subsidiary entry into a disaster affected province. Governmental responses to natural disasters are generally locally coordinated. This requires firms to have a deeper understanding of “how things get done” in a particular province or locale, what the governance quality and capacity are in a given location compared to a MNCs’ home country, and which entities one can work with in a crisis.
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